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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/982,980	10/22/2001	Myung Cheol Yoo	9323.013.00	7233
30827	7590	06/28/2004	EXAMINER	
MCKENNA LONG & ALDRIDGE LLP			ROCCHEGIANI, RENZO	
1900 K STREET, NW			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20006			2825	

DATE MAILED: 06/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/982,980

Applicant(s)

YOO, MYUNG CHEOL

Examiner

Renzo N. Rocchegiani

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24,27-33,35-41 and 43-78 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24,27-33,35-41 and 43-78 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Claim Objections

1. Claim 30 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. This claim recites the limitation of forming the scribe lines through an ICP RIE process, the same limitation is found in the claim upon which claim 30 depends. Thus, claim 30 is not further limiting.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-12, 35-37, 49-54 and 73-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,379,985 B1 (Carvantes et al.) in view of U.S. Patent No. 6,564,445 B1 (Hashimoto et al.) and in further view of U.S. Patent No. 5,103,269 (Tomomura et al.).

Carvantes et al. discloses a method to form a plurality of light emitting diodes (col. 3, lines 30-35) that have a transparent substrate comprising the steps of depositing a buffer layer over a sapphire substrate (col. 3, lines 30-33 & col. 10, lines 38-49 & Fig. 14), depositing an n-type GaN layer over the buffer layer (col. 10, lines 50-55 & Fig. 14), depositing a InGaN active layer over the n-type layer (col. 10, lines 55-63 & Fig. 14),

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depositing a p-type GaN layer over the active layer (col. 10, lines 63-67 & Fig. 14), depositing a p-type conductive metal over the p-type layer (col. 11, lines 7-15 & Fig. 14), etching the p-type metal and p-type GaN layer and active layer to expose the n-type GaN layer and depositing an n-type metal over the n-type GaN layer (col. 11, lines 17-19 & Fig. 14). The process further comprises forming scribe lines by applying an IRE dry etching process to either side of the substrate and through any layer deposited over the substrate (col. 5, lines 33-37). The substrate is polished and etched to define a specific thickness (col. 9, lines 5-11). All the layers are deposited by epitaxial deposition. (col. 7, lines 40-45).

Carvantes et al. discloses the additional use of mirror elements within the diode but does not disclose the deposition of a reflective layer over the bottom surface of the substrate. Carvantes et al. also does not specify the roughness of the substrate and the size of the scribe lines. Finally Carvantes et al. does not disclose the use of ICP RIE to polish the substrate.

Hashimoto et al. teaches that a sapphire material may be polished via an ICP RIE. (col. 16, lines 9-18).

Tomomura et al. teaches forming a light emitting device comprising a substrate whereupon an n-type layer and active layer and a p-type layer are deposited, wherein p-type and n-type metals are deposited over the p-type and n-type layers respectively (col. 7, lines 1-67), and wherein a reflective layer is deposited on the back side of the substrate. (col. 7, lines 60-67)

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It would have been obvious to one having ordinary skill in the art to use ICP RIE to polish the sapphire substrate, since Hashimoto et al. teach that ICP RIE is a well known process that is easily interchangeable with other well known processes. (Hashimoto et al; col. 16, lines 9-18).

It would have been obvious to one having ordinary skill in the specific art to combine the teachings of Tomomura et al. to the invention of Carvantes et al., since, as taught by Tomomura et al., depositing a reflective layer over the bottom surface of the semiconductor substrate will result in a device that emits a light of higher luminance. (See Tomomura et al. col. 7, lines 60-67).

Furthermore, it would have been obvious to one having ordinary skill in the art to define the preferred roughness of the substrate and scribe line sizes, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Also, it has been held that a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

4. Claims 14-24, 38-41, 43-48 and 55-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,379,985 B1 (Carvantes et al.) in view of U.S. Patent No. 6,242,276 B1 (Back et al.) and in further view of U.S. Patent No. 5,103,269 (Tomomura et al.).

Carvantes et al. discloses a method to form a plurality of light emitting diodes

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(col. 3, lines 30-35) that have a transparent substrate comprising the steps of depositing a buffer layer over a sapphire substrate (col. 3, lines 30-33 & col. 10, lines 38-49 & Fig. 14), depositing an n-type GaN layer over the buffer layer (col. 10, lines 50-55 & Fig. 14), depositing a InGaN active layer over the n-type layer (col. 10, lines 55-63 & Fig. 14), depositing a p-type GaN layer over the active layer (col. 10, lines 63-67 & Fig. 14), depositing a p-type conductive metal over the p-type layer (col. 11, lines 7-15 & Fig. 14), etching the p-type metal and p-type GaN layer and active layer to expose the n-type GaN layer and depositing an n-type metal over the n-type GaN layer (col. 11, lines 17-19 & Fig. 14). The process further comprises forming scribe lines by applying an IRE dry etching process to either side of the substrate and through any layer deposited over the substrate (col. 5, lines 33-37). The substrate is polishes and etched to define a specific thickness (col. 9, lines 5-11). All the layers are deposited by epitaxial deposition. (col. 7, lines 40-45).

Carvantes et al. discloses the additional use of mirror elements within the diode but does not disclose the deposition of a reflective layer over the bottom surface of the substrate. Carvantes et al. also does not specify the roughness of the substrate and the size of the scribe lines. Finally Carvantes et al. does not disclose the use of ICP RIE to form the scribe lines.

Back et al. teaches that small grooves may be formed via an ICP RIE. (col. 3, lines 46-57).

Tomomura et al. teaches forming a light emitting device comprising a substrate whereupon an n-type layer and active layer and a p-type layer are deposited, wherein p-

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type and n-type metals are deposited over the p-type and n-type layers respectively (col. 7, lines 1-67), and wherein a reflective layer is deposited on the back side of the substrate. (col. 7, lines 60-67)

It would have been obvious to one having ordinary skill in the art to use ICP RIE to form the scribe lines, since Back et al. teach that ICP RIE is a well known process that is more precise than regular RIE and thus would result in a more defined groove. (Back et al. col. 3, lines 46-57)

It would have been obvious to one having ordinary skill in the specific art to combine the teachings of Tomomura et al. to the invention of Carvantes et al., since, as taught by Tomomura et al., depositing a reflective layer over the bottom surface of the semiconductor substrate will result in a device that emits a light of higher luminance. (See Tomomura et al. col. 7, lines 60-67).

Furthermore, it would have been obvious to one having ordinary skill in the art to define the preferred roughness of the substrate and scribe line sizes, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Also, it has been held that a change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

5. Claims 13, 27-33 and 61-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,379,985 B1 (Carvantes et al.) in view of U.S.

Patent No. 6,564,445 B1 (Hashimoto et al.) and of U.S. Patent No. 5,103,269 (Tomomura et al.) and in further view of U.S. Patent No. 6,242,276 B1 (Back et al.)

As stated in paragraph 3, all the limitations of these claims have been met except for teaching that the scribe lines are also formed by ICP RIE.

Back et al. teaches that small grooves may be formed via an ICP RIE. (col. 3, lines 46-57).

It would have been obvious to one having ordinary skill in the art to use ICP RIE to form the scribe lines, since Back et al. teach that ICP RIE is a well known process that is more precise than regular RIE and thus would result in a more defined groove. (Back et al. col. 3, lines 46-57)

Response to Arguments

6. Applicant's arguments with respect to claims 1-24, 27-33, 35-41 and 43-78 have been considered but are moot in view of the new ground(s) of rejection. Applicant's petition for revival has been granted. The applicant has amended the claims to add the limitations of either polishing the substrate via an ICP RIE process, or forming the scribe lines using an ICP RIE process, or both. The examiner has found new prior art that renders these newly added limitations obvious. The rejection is presented above.

Conclusion


7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Renzo N. Rocchegiani whose telephone number is (571)272-1904. The examiner can normally be reached on Mon.-Fri. 8:00 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Renzo N. Rocchegiani
Examiner Art Unit 2825

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